Integrated Geo-Modelling & Reservoir Management: Visualization and Planning of Closely Spaced Horizontal Wells, Hayter Heavy Oil Reservoir, AB

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ABSTRACT
The Cretaceous reservoir sands in the Hayter Dina heavy oil pool, eastern Alberta, form part of an estuarine valley fill deposit consisting of several channel point-bar cycles each of which is superimposed, and/or downcut into, the preceding one. Consequently, reservoir quality and pay thickness are best developed where point-bar sandstones have amalgamated near the channel thalwegs, and diminish rapidly in south and southwest directions where IHS beds (interbedded sandstone and mudstone) are most prevalent. Thus the detailed modelling and horizontal well placement strategy will have a direct bearing on the production and ultimate recovery from this reservoir.

An integrated reservoir model was developed utilizing the model described above with additional control from 3D seismic structure and horizontal wells. These were implemented through visualization of an additional 95 horizontal and deviated well trajectories in a 1.6 square mile study area. Enhancement of the model was further extended to visualization of a cone of uncertainty around the well trajectory surveys using SMART 4D Modelling. This is used to evaluate existing well trajectories and mitigate potential collision of closely spaced additional proposed wells thereby avoiding costly problems associated with well path collisions.

The 3D visualization of the modeled porosity, SW and GR reservoir attributes as well as facies mapping assist in the understanding of potential conduits and barriers to flow as well as in providing detailed Oil in Place (OOIP) calculations for each of the channel sands.

With the maintenance of a detailed model for continued well placement and production strategies a good understanding of this producing asset can be realized. The maintenance and updating of this geostat-based model, besides the practice of good reservoir management, enables generation of a reliable upscaling dataset for flow simulation purposes.